



WMSC Commissioner Brief: W-0061 – Improper movement – Branch Avenue Yard – September 3, 2020

Prepared for Washington Metrorail Safety Commission meeting on March 2, 2021

Safety event summary:

At approximately 11:51 p.m. on September 3, 2020, the Branch Avenue Yard Interlocking Operator remotely manipulated a switch under a Sperry ultrasonic testing vehicle that was exiting onto mainline tracks and gave permission to the operator of Train 515, a train that had just gone out of service at Branch Ave. Station, to move the train through the interlocking that was still occupied by the Sperry vehicle. The switch movement led to the Sperry vehicle taking a route directly toward Train 515 at the same time that Train 515 was granted permission to move forward toward the location of the Sperry vehicle, creating circumstances that could have led to a head-on collision.

The attention to detail and focus of the operator of Train 515 and the Sperry operator successfully made the outcome of this safety event a near-miss. The outcome of avoiding a collision in this specific case does not reduce the need for safety mitigations that reduce the likelihood of a similar event occurring in the future.

The Interlocking Operator had given the Sperry vehicle operator permission to exit the yard, and the Sperry vehicle operator had correctly informed the Interlocking Operator that there would be a further radio transmission once the vehicle got permission from the Rail Operations Control Center (ROCC) to enter mainline tracks. However, approximately three minutes later, the Interlocking Operator operated the switch and directed the train operator to proceed prior to any additional communication between the Interlocking Operator and the Sperry operator and prior to the Sperry vehicle moving beyond the interlocking. The Interlocking Operator stated that they took this action based solely on an assumption that the Sperry vehicle was no longer present.

Like other hi-rail vehicles, the Sperry vehicle does not always shunt the rails (show occupancy in the automatic train control and signal system). Therefore, the vacancy showing in the area of the interlocking was not accurate. AIM playback shows that the Sperry vehicle showed occupancy prior to entering the interlocking but did not shunt within the interlocking.

As the Interlocking Operator gave Train 515 an absolute block to proceed into the yard, the Train Operator reported that the Branch Ave. Station signal Train 515 was holding at turned red and that the Sperry vehicle was moving toward them. The Sperry unit operator then stated over the radio that the Sperry vehicle remained in the interlocking area and that the switch had moved just before the vehicle was passed over it. The Sperry operator reported that the vehicle did not derail, but that the vehicle did move in the direction of the train on the platform.

The Sperry operator reversed back past the switch (without coordinating that movement with the Interlocking Operator), and the Interlocking Operator then reset the switch alignment for the Sperry vehicle. The Sperry operator stated that the Interlocking Operator instructed them to contact the ROCC. The Sperry vehicle then exited the yard on the originally intended path to Branch Ave. Station Track 1.

An ATC Maintenance inspection following this event did not identify any damage to the interlocking.



Probable Cause:

The probable cause of this event is Metrorail's insufficient training for personnel, including interlocking operators, regarding hi-rail vehicles not shunting the rails, complacency and reliance solely on automated information systems, and a yard tower environment that does not provide for adequate focus on procedures, radio protocols and vehicle movement.

Corrective Actions:

RTRA is reviewing the movement processes for non-shunting vehicles.

The Interlocking Operator was re-trained.

The Sperry unit operator received refresher training related to the movement made after the Interlocking Operator improperly moved the switch while the Sperry unit was in motion.

WMSC staff observations:

In an interview, the Interlocking Operator, who had three years of experience, did not appear to be familiar with all rules and procedures, including stating that they should have contacted the ROCC rather than the Sperry unit operator to confirm the location of the vehicle. This suggests WMATA must improve training for Interlocking Operators.

The Interlocking Operator also used the incorrect name for the F11-32 signal (F99-32), and ATC personnel submitted a report referencing F99-32, a signal that is actually labelled F11-32. This suggests more familiarization training may be required.

In March 2020, SAFE meeting minutes indicate that RTRA leadership verbally stated that a safety stand down was held with interlocking operators that focused on hi rail vehicles not shunting, however written documentation of this stand down is not available and it is not clear whether this actually occurred for all interlocking operators.

Staff recommendation: Adopt final report.

Washington Metro Area Transit Authority

Department of Safety and Environmental Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E20329

Date of Event:	9/3/2020
Type of Event:	Unintended Movement
Incident Time:	23:47 hrs.
Location:	Branch Avenue Yard Lead 1
Time and How received by SAFE:	00:19 hrs. Safe On-call Phone
WMSC Notification Time:	01:35 hrs.
Responding Safety Officers:	WMATA SAFE: Yes WMSC: No Other: N/A
Rail Vehicle:	None
Injuries:	None
Damage:	None
Emergency Responders:	N/A

Branch Avenue Yard – Unintended Movement

September 3, 2020

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Abbreviations and Acronyms

AIMS	Advanced Information Management System
ARS	Audio Recording Service
ATCE	Automatic Train Control Engineering
ATCM	Automatic Train Control Maintenance
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic Atmospheric Administration
ROCC	Rail Operations Control Center
ROQT	Rail Operations Quality Training
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
SAFE	Department of Safety & Environmental Management
SOP	Standard Operating Procedure
TRST	Office of Track and Structures
WMATA	Washington Metropolitan Area Transit Authority

Executive Summary

On Thursday, September 3, 2020, Sperry Unit 800 was scheduled to perform ultra-sonic testing on the L-line bridge. The Interlocking Operator granted the Sperry Unit Pilot an absolute block to F11-32 signal with instructions to change to Ops three (3) channel [Rail Operations Control Center (ROCC)]. The Train Operator aboard Train ID 515 arrived at Branch Avenue Station, Track 2, and reported to the Terminal Supervisor that their train has been offloaded, verified clear of customers, and were standing by to switch to the rail yard operational radio channel to transport their consist to the rail yard for storage. The Terminal Supervisor advised the Train Operator to contact the Interlocking Operator for further instructions. At 23:47 hrs., the Train Operator requested to enter the yard, and the Interlocking Operator advised the Train Operator that a Unit was traversing through the interlocking and to standby. At 23:51 hrs., the Interlocking Operator granted the Train Operator an absolute block from the F11-38 signal to Track 7 in the yard. The Interlocking Operator did not verify that the non-shunting Sperry Unit was clear of the interlocking before moving Train ID 515; the Train Operator reported that the signal dropped red in front of their train.

The Interlocking Operator instructed the Train Operator to standby and to not move their train while they attempted to locate the exact position of the Sperry Unit 800. After the Interlocking Operator contacted the Train Operator, the Sperry Unit 800 Pilot reported their Unit was in the interlocking. The Interlocking Operator placed F11-5A switch in reverse position via the interlocking board before the Sperry Unit reported clear. The Sperry Unit Pilot requested the Interlocking Operator to not move Train ID 515. The Operator of the Sperry Unit reversed their Unit to clear F11-32 signal; however, they did not request permission to reverse their Unit to clear the F11-32 signal. The Interlocking Operator stated that they were under the assumption that the Sperry Unit had cleared the rail yard due to the Advanced Information Management System (AIMS) not showing any indications that there was any occupancy in the associated track circuits.

As requested by the ROCC, Automatic Train Control Maintenance (ATCM) arrived on the scene and conducted an interlocking inspection and a switch obstruction test to verify that there was no interlocking damage. Upon completing the interlocking assessment, ATCM personnel discovered no damage and placed the interlocking back in service.

The ROCC Assistant Superintendent notified SAFE that on September 3, 2020, at approximately 00:19 hrs., the Branch Avenue Division Interlocking Operator was removed from service and transported for post-incident toxicology testing as a result of the

misaligned switch movement. There were no injuries or damage reported as a result of this incident.

The probable cause of this event is Metrorail's insufficient training for personnel, including interlocking operators, regarding hi-rail vehicles not shunting the rails, complacency and reliance solely on automated information systems, and a yard tower environment that does not provide for adequate focus on procedures, radio protocols and vehicle movement.

SAFE determined that the Interlocking Operator did not verify that Sperry Unit 800 cleared the yard before setting a crossover-move for the non-revenue train to enter the yard. The Interlocking Operator was not in compliance with the Metrorail Safety Rules and Procedures Handbook (MSRPH) Train Movement/Track Operation, section 35.4.4, "The Yard Interlocking Operator are responsible for ensuring switches are properly aligned and secured for the desired train movement."

Additionally, SAFE determined that the Operator of the Sperry Unit did not request permission to reverse their Unit to clear the F11-32 signal after notifying the I/O that they were still in the interlocking. The Sperry Pilot Operator was not in compliance with the Metrorail Safety Rules and Procedures Handbook (MSRPH) Section 3 - Operating Rules, 3.100 "Class II vehicles shall be operated under Absolute Block (SOP # 15) procedures at all times."

As a result of this investigation, SAFE makes the following recommendations:

To RTRA, undertake a review of the non-shunting vehicles movement process to identify opportunities to incorporate a checklist for Interlocking Operator usage during movement.

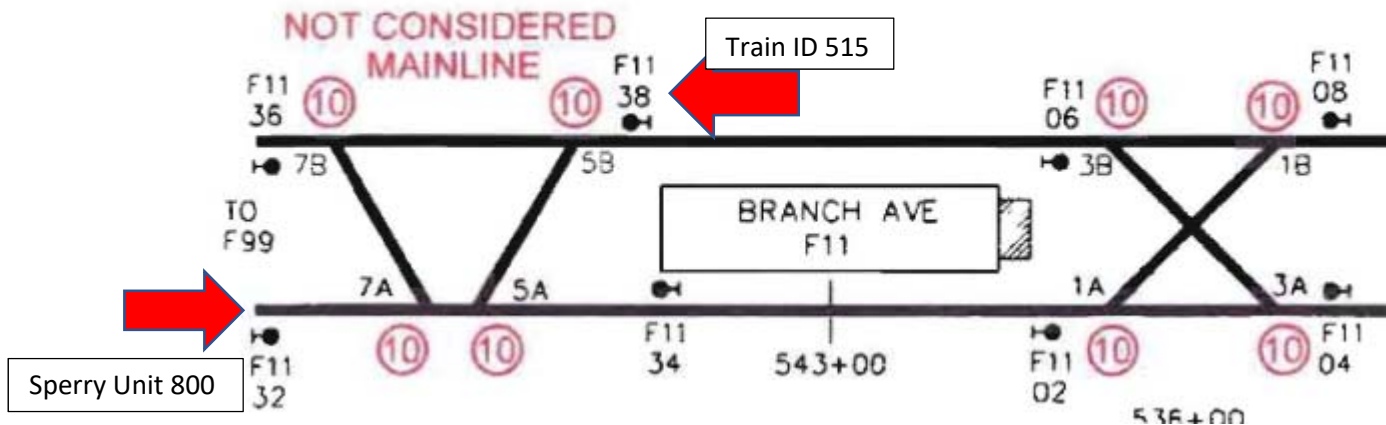
To RTRA, conduct re-training with the Interlocking Operator incorporating a simulation of the Unintended Movement to identify procedures that were not followed during the incident.

TRST shall contact the Rail Operations Quality Training (ROQT) Department so that the Sperry Unit Pilot can receive refresher training.

Incident Site

Branch Avenue Yard Lead 1

Field Sketch/Schematics



Purpose and Scope

The purpose of this incident investigation and candid self-evaluation is to collect and analyze available facts, determine the probable cause(s) of the incident, identify contributing factors, and make recommendations to prevent a recurrence.

Investigation Process and Methods

Upon advisement of the Unintended Movement at Branch Avenue Yard on September 3, 2020, SAFE dispatched a cross-functional team to assess the scene and conduct the subsequent investigation. SAFE team members worked with relevant WMATA subject matter experts to review the incident's facts and data.

Investigation Methods

The investigative methodologies included the following:

- Physical Site Assessment
- Formal Interviews – SAFE interviewed three (3) individual(s) as part of this investigation. Interviews included persons present during and after the incident, those directly involved in the response process. SAFE interviewed the following individuals:
 - Interlocking Operator

- Train Operator
 - Sperry Unit Pilot
- Informal Interviews – Collected through conversations with individuals during the course of the investigation to provide background and supporting information
 - Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
 - Employee Training Procedures & Records
 - Certifications
 - The 30-Day work history review
 - MSRPH
 - National Oceanic Atmospheric Administration (NOAA) data review
 - System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback [Radio and Phone Communications]

Investigation

On Thursday, September 3, 2020, Sperry Unit 800 contacted the Branch Avenue Yard Interlocking Operator and requested permission to leave [exit] the yard to perform scheduled ultrasonic testing on the L-line bridge. The Interlocking Operator granted the Sperry Unit an absolute block to the F11-32 signal at approximately 23:42 hrs. At approximately 23:47 hrs., non-revenue Train ID 515 notified the Terminal Supervisor that their train was offloaded, clear of customers, and standing by to enter Branch Avenue Yard for storage. The Branch Avenue Station Terminal Supervisor instructed the Train Operator of Train ID 515 to contact Branch Avenue Yard Interlocking Operator at the F11-38 signal. The Branch Avenue Station Terminal Supervisor advised the Train Operator of Train ID 515 there was a Unit currently in the interlocking on approach to the platform and standby. At 23:48 hrs. Sperry Unit 800 notified the Branch Avenue Yard Interlocking Operator they were switching over to Rail Operations Control Center (ROCC) Ops three (3) and would inform the I/O when the Unit was clear of Branch Avenue Yard. At 23:51 hrs., the Interlocking Operator granted the Train Operator of Train ID 515 an absolute block from the F11-38 signal to Track 7 for storage.

Before the Train Operator of Train ID 515 executed the absolute block as instructed, the Train Operator reported via Radio that, "F11-38 signal dropped red," the Interlocking Operator then instructed the Train Operator of Train ID 515 to standby. After instructing Train ID 515 to standby, the Interlocking Operator attempted to ascertain the position of

Sperry Unit 800. At approximately 23:51 hrs. Sperry Unit 800 requested that the Interlocking Operator refrain from moving the non-revenue train due to their interlocking switch position. Sperry Unit 800 reported a switch movement while they were in approach to the F11-32 signal. The Interlocking Operator stated, "they were under the impression that the unit had cleared the yard due to there being no indication showing any occupancy in the associated circuit." Sperry Unit 800 reported, there was no derailment and requested a realignment."

At approximately 23:53 hrs., Train ID 515 Train Operator reported to the Interlocking Operator that the Sperry Unit had reversed back to clear F11-32 signal. The Interlocking Operator set an alignment for Sperry Unit 800 to continue on its absolute block in the direction of Branch Avenue Station. ROCC notified SAFE that on September 3, 2020, at approximately 00:05 hrs., the ROCC removed the Branch Avenue Division Interlocking Operator from service for post-incident toxicology testing as a result of the misaligned switch movement.

Automatic Train Control Maintenance (ATCM) arrived on the scene and conducted an interlocking inspection and a switch obstruction test to verify that there was no interlocking damage. Upon completing the interlocking assessment, ATCM personnel discovered no damage and placed the interlocking back in service. There were no injuries or damage reported as a result of this incident.

Chronological Event Timeline

23:42:32 hrs.	Sperry Unit 800 granted an absolute block from F99-60 to F11-32 signal and to notify when the Unit is clear of the yard. [Ambient]
23:42:46 hrs.	Sperry Unit acknowledges the absolute block to the F11-32 signal and to include notification when the Unit is clear of the yard. [Ambient]
23:47:17 hrs.	The Terminal Supervisor gave the Train Operator operating Train ID 515 permission to contact the Interlocking Operator to request permission to enter the yard for storage. [Ambient]
23:47:46 hrs.	The Train Operator contacted the Interlocking Operator to enter the yard, standing by the F11-38 signal. [Ambient]
23:47:56 hrs.	The Interlocking Operator advised the Train Operator that there is a unit traversing the interlocking and to standby. [Ambient]
23:48:20 hrs.	Sperry Unit 800 advises the Interlocking Operator their Unit is holding at the F11-32 signal and will advise when they are clear of the yard. [Ambient]
23:51:24 hrs.	The Train Operator was given an absolute block from the F11-38 signal to Track 7. Train Operator repeats the block and then states, "signal dropped red." [Ambient]

23:51:50 hrs.	Interlocking Operator instructed Train ID 515 to standby Branch Avenue Station, Track 2. [Ambient]
23:51:54 hrs.	Sperry Unit 800 requested that the Interlocking Operator refrains from moving Train ID 515 due to the Unit fouling the interlocking. [Ambient]
23:52:10 hrs.	Sperry Unit 800 notified the Interlocking Operator that switches were thrown while the Unit was moving, and the Unit did not derail. [Ambient]
23:52:33 hrs.	Interlocking Operator reported that they were under the impression the Unit had cleared the yard because their screen did not show any occupancy in the circuit. [Ambient]
23:52:41 hrs.	Sperry Unit 800 requested a realignment. [Ambient]
23:53:50 hrs.	Train 515 reported that Sperry Unit 800 was standing by behind the F11-32 signal. [Ambient]

Automatic Train Control Engineering (ATCE)

ATC Engineering Analysis Timeline:

Time	Description
23:47:35 hrs.	F11-32 signal lunar with Sperry Unit 800 in approach showing occupancy.
23:50:27 hrs.	Track circuit 5T vacant, which detected no occupancy. F11-32 signal red.
23:51:08 hrs.	F11-38 entrance to F11-32 exit initiated. (This is a cross over move)
23:51:10 hrs.	F11- 5A/B switch is throwing reverse in the interlocking.
23:51:37 hrs.	Sperry Unit proceeded on the turnout. Switch 5A is reverse.
23:53:15 hrs.	F11- 32 entrance to F11- 34 exit initiated.

Advanced Information Management System

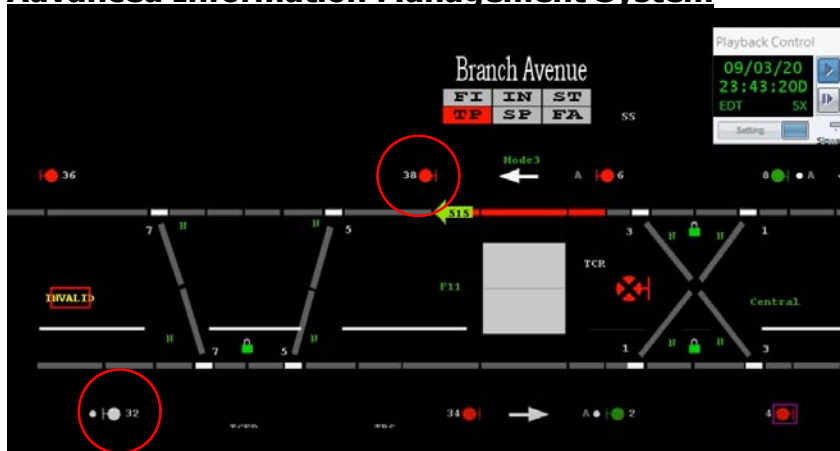


Photo 1: Train ID 515 standing by to enter the yard. F11- 32 lunar set for Sperry Unit 800 to enter the mainline tracks.

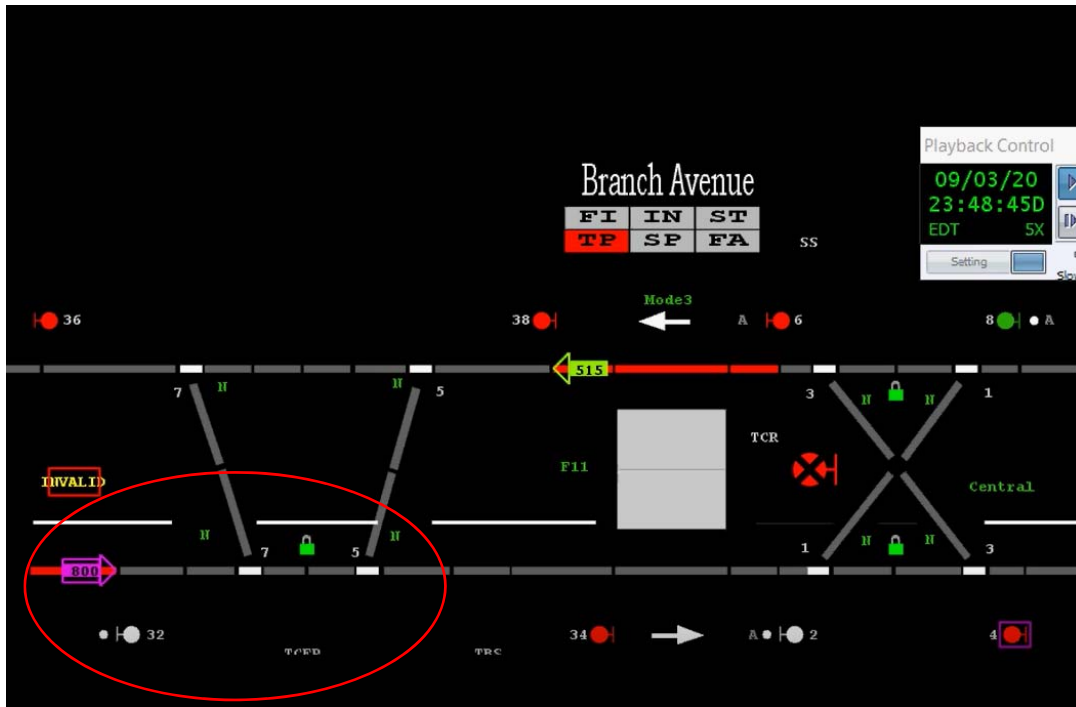


Photo 2: Sperry Unit 800 showing occupancy with a lunar and rail alignment for Branch Avenue, Track 1.

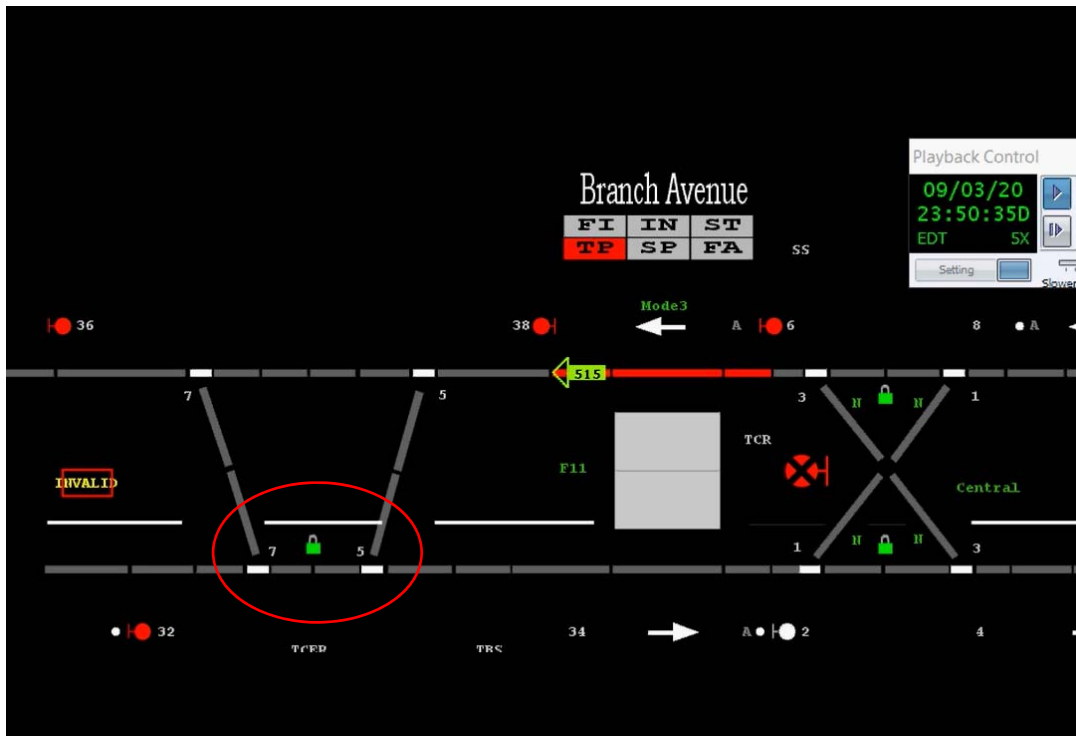


Photo 3: Sperry Unit 800 showing occupancy with a lunar and rail alignment for Branch Avenue, Track 1.

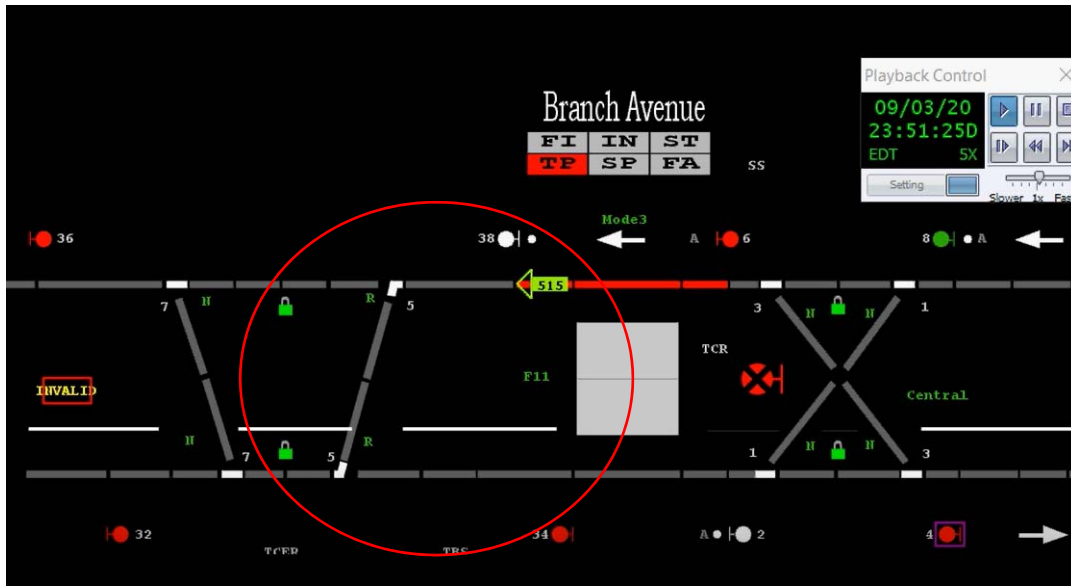


Photo 4: Route set for Train 515 to enter the yard. No occupancy is shown at the F11-32 signal.

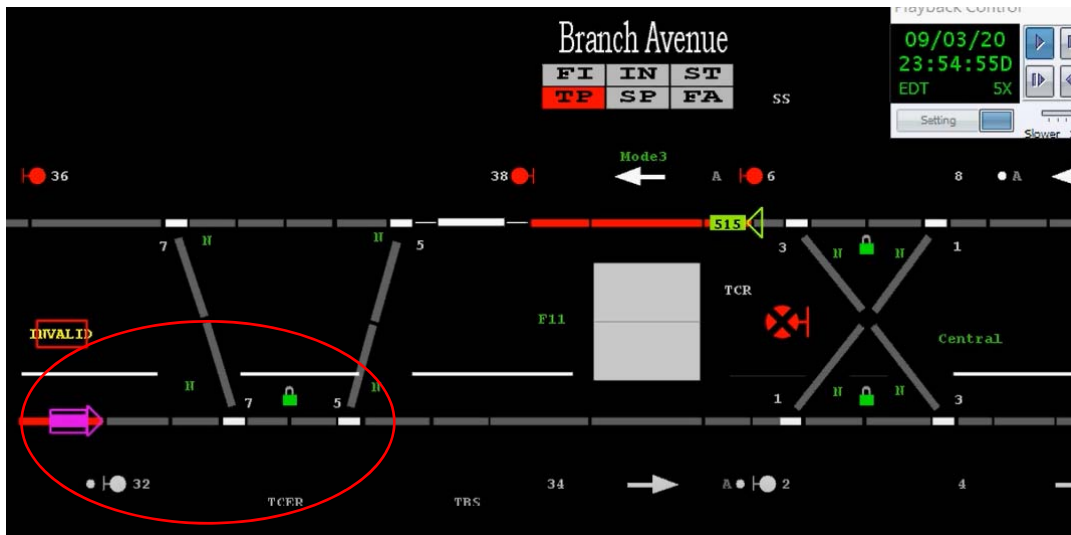


Photo 5: Alignment reset for Sperry Unit 800; Unit now showing occupancy.

Interview Findings

Based on the investigation launched into the Branch Avenue Yard Unintended Movement event, SAFE conducted three (3) investigative interviews and identified the following key findings associated with this event, as follows:

Interlocking Operator assumed the Sperry Unit cleared the interlocking and switched to the mainline operations channel. The Interlocking Operator did not verify over the Radio or contact ROCC via Telephone to confirm that the Sperry Unit cleared the interlocking before setting the lead for Train ID 515 to enter the rail yard;

Findings

- The Interlocking Operator did not verify that Sperry Unit 800 cleared the yard before setting a crossover-move for the non-revenue train to enter the yard. The Interlocking Operator was not in compliance with the Metrorail Safety Rules and Procedures Handbook (MSRPH) *Train Movement/Track Operation, section 35.4.4, "The Yard Interlocking Operator are responsible for ensuring switches are properly aligned and secured for the desired train movement."*
- The Sperry Unit Pilot Operator did not request permission to reverse their Unit and clear the F11-32 signal after reporting their location. Metrorail Safety Rules and Procedures Handbook (MSRPH) Section 3 - Operating Rules, 3.100 *"Class II vehicles shall be operated under Absolute Block (SOP # 15) procedures at all times."*

Weather

At the time of the incident, NOAA recorded the temperature at 82 °F and clear. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA – Location: Branch Avenue, MD.)

Human Factors

Fatigue

Based on SAFE interview question related to Fatigue Factors and a review of all employees' 30-day work history, SAFE determined the employees' hours of service were in accordance with WMATA's *Fatigue Risk Management Policy 10.6* and *Hours of Service Limitations for Prevention of Fatigue Policy 10.7*

Post-Incident Toxicological Testing

After reviewing all employee post-incident testing results, SAFE determined that the employees involved were not violating the Drug and Alcohol Policy and Testing Program 7.7. 3/5, therefore, being under the influence of a controlled substance has been excluded as a contributing factor.

Probable Cause Statement

The probable cause of this event is Metrorail's insufficient training for personnel, including interlocking operators, regarding hi-rail vehicles not shunting the rails, complacency and reliance solely on automated information systems, and a yard tower environment that does not provide for adequate focus on procedures, radio protocols and vehicle movement.

SAFE Recommendations

As a result of this investigation, SAFE makes the following recommendations:

To RTRA, undertake a review of the non-shunting vehicles movement process to identify opportunities to incorporate a checklist for Interlocking Operator usage during movement.

To RTRA, conduct re-training with the Interlocking Operator incorporating a simulation of the Unintended Movement to identify procedures that were not followed during the incident.

TRST shall contact the Rail Operations Quality Training (ROQT) Department so that the Sperry Unit Pilot can receive refresher training.

Appendix A Interview Summaries

Interviews

RTRA

Train Operator

The Train Operator is a WMATA employee with twelve (12) years of experience as a Train Operator and fourteen (14) years of service in various roles.

The Train Operator reported that they were at the 8-car marker at Branch Avenue Station, Track 2. The Train Operator stated that they could hear the radio communications between the Sperry Unit and the Interlocking Operator and heard the Interlocking Operator grant permission to the Sperry Unit to move on an absolute block to the F11-32 signal. The Train Operator stated that they noticed the Unit moving through an overpass on the tracks. The Train Operator then indicated that they received a flashing lunar at F11-38 signal, and the Interlocking Operator gave the train Operator an absolute block to Track 7 in Branch Avenue Yard; while the Train Operator was in the middle of providing a repeat back, they observed the Sperry Unit moving in their direction. The Train Operator stated that the Sperry Unit reversed and cleared the F11-32 signal. The Train Operator reported that the Interlocking Operator attempted to ascertain the location of the Sperry Unit, and the Sperry Unit reported that they were traversing the interlocking with a destination to Track 1 and that they cleared F11-7A switch and that F11-5A switch threw in a reverse position. The Train Operator stated that the Interlocking Operator asked them where the Sperry Unit in relation to their train, and the Train Operator reported that the Sperry Unit was clear of the F11-32 signal. The Train Operator said there was no communication between the Sperry Unit and the Interlocking Operator to reverse the F11-32 signal. The Train Operator continued to standby on Track 2, awaiting ATCM personnel to conduct a switch inspection verifying no damage.

Interlocking Operator

The Interlocking Operator is a WMATA employee with three (3) years of experience as a Interlocking Operator and fourteen (14) years of service in various positions as a Bus Operator and Train Operator.

The Interlocking Operator stated that Sperry Unit 800 contacted them to exit the rail yard to enter the mainline. The Interlocking Operator noted that they gave the Sperry Unit an absolute block to the F11-32 signal and to contact ROCC for further instructions. The Interlocking Operator then stated that when they say that the interlocking board showed no occupancy in the track circuit, they set a lunar for the Train ID 515 to enter the yard. The Interlocking Operator reported that the Sperry Unit Pilot said they observed the F11-5A switch throw in a reverse position. The Interlocking Operator confirmed that the Sperry Unit did not derail and that Train ID 515 did not move from their location. The Interlocking Operator stated that the Sperry Unit had cleared the F11-7A switch, and when they observed the F11-7A switch in reverse, they stopped their Unit in the middle of the interlocking. The Interlocking Operator stated that they did not grant permission to the Sperry Unit to reverse ends and clear the F11-32 signal. The Interlocking Operator said they should have contacted ROCC to confirm the Unit had cleared the railyard before setting the lunar and alignment to allow the non-revenue train to enter the rail yard.

Track and Structures

The Sperry Pilot Operator is a WMATA employee with one (1) year of experience as a Pilot Operator and five (5) years of service in various positions as a Track Inspector.

The Pilot Operator reported holding at F11-32 signal lunar and contacted the Radio RTC to request an absolute block to Branch Avenue, Track 1. The Pilot Operator stated that they received their absolute block to Branch Avenue, Track 1. While traversing the interlocking, the Pilot Operator said, after the Unit cleared the F11-7A switch, they observed that F11-5A threw in a reverse position and that they were moving in the direction of a train on the platform. The Pilot Operator switched their Radio to the yard Ops and could hear the Interlocking Operator in the process of giving the train on Track 2 an absolute block in Branch Avenue Yard; the Pilot Operator stopped the Unit and reversed to clear F11-32 signal stating they were not aware of the train was going to move on the absolute block that was given. While operating [in the direction] to clear the F11-32 signal, the Pilot Operator requested that the Interlocking Operator not move the train due to the Sperry Unit in the interlocking. The Pilot Operator stated that the Interlocking Operator instructed them to switch to mainline Ops. The Pilot Operator contacted the Radio RTC and was told to standby due to the incident.